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TITLE: Communication system for wireless communication of
content to users

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Abstract Text - ABTX (1):

A communication system (10) provides content to communication devices (12) over one or more wireless channels that support packet data communication under a specified radio packet data transmission protocol, such as GPRS. The communication system (10) receives proximity and functionality information from the communication devices (12). Based on the proximity and functionality level information, the communication system (10) determines an optimum data rate and optimum content format for communicating the content with the communication devices (12). Using the optimum data rate and content format, the content is transmitted to the communication devices (12) over a wireless channel, thereby optimizing the air time and providing the best user experience regardless of communication device capability or position.

Application Filing Date - AD (1):

20001030

Detailed Description Text - DETX (3):

The communication system receives proximity information and functionality level information from a communication device. The functionality level information can for example relate to communication device's processing or content display capabilities. The proximity information can for example correspond to a received signal strength from the communication device at a communication system base station. Alternatively, the proximity information can be transmitted from the communication device in terms of coordinates corresponding to a defined positioning system. Based on the proximity and functionality level information, the system determines an optimum data rate and content format for communicating the content with the communication device. Using the optimum data rate and content format, the content is transmitted to the communication device over a wireless channel, thereby optimizing the air time.

Detailed Description Text - DETX (5):

According to one of the more detailed features of the invention, the data packets are communicated with control information that define the content, format. The content format specifies how the content is presented or displayed at the communication device. For example, if the content comprises a graphic content made up of a number of data packets that correspond to graphic images,

the graphic content is transmitted with control information that include at least one of number of graphic images, size of each graphic image, graphic display speed, screen size format of each graphic image, and functionality level of the graphic content. Similarly, audio or any other type of content may be communicated with corresponding control information. Based on the control information, which define the content format, determination is made at the communication device as to how to present the content to the user.

Detailed Description Text - DETX (11):

In an exemplary embodiment, the mobile data messaging service of the communication system 10 is provided by a GPRS defined standard. A GPRS network 14 deployed in the communication system 10 utilizes the existing GSM nodes, in addition to others, for supporting packet switching, and inter-working with existing packet data networks, such as Internet 16, X-25 networks 18 and a private networks 20. In this way, various types of content, such as image content made up of moving images, can be communicated to the communication devices 12. The communication devices 12 are also equipped to handle GPRS provided mobile packet data service, in addition to handling voice service. Examples of such communication devices 12 include smart phones, Personal Digital Assistances (PDA), or portable computers, such as a lap tops, or palm tops that operate with or without a cellular telephone.

Detailed Description Text - DETX (15):

Referring to FIG. 2, communication protocol stack 40 for communicating data packets between the communication system 10 and the communication devices 12 is shown. Among other things, the communication protocol stack 40 comprises: a sub-network dependent control protocol (SND CP) layer that encrypts and compresses data packet segments; a logical link control (LLC) layer that links an underlying air or radio interface to the SGSN 20; a radio link control (RLC) layer that supports error correction; a medium access control (MAC) layer that supports slotted ALOHA scheme; a physical link sub-layer (PLL) that frames and codes the packets and also manages the physical medium error; and a radio frequency layer (RFL) that modulates and demodulates the transmitted packet over the radio frequency channels. The details of the SGSN 28 and GGSN 30 are both invisible and irrelevant to the user who simply experiences a straightforward IP or X.25 connection that just happens to be wireless. As stated above, the radio frequency channels in the GSM/GPRS implementation are divided into repetitive frames comprising 8 time slots. At the radio interface 42 the IP/X.25 packet within the communication protocol stack 40 is converted to a corresponding IP/X.25 packet within the protocol stack 44 used in a wired network.

Detailed Description Text - DETX (30):

Referring to FIG. 7, the flow chart of a method for communicating content in accordance with the present invention is shown. The method involves receiving proximity and functionality level information from the communication device, block 710. As stated above, the functionality level information can, for example, include data processing and/or display level functionality at the communication device. The communication device can provide the proximity information based on a transmitted signal the received strength of which at the

BSS 22 relates to its proximity. Alternatively, the controller 54 may cause the transmission of the proximity information in the form of data packets that relate to received data from the proximity sensor or a positioning receiver 82. The method of the present invention also involves determining an optimum data rate and content **format** for communicating the content with the communication device, based on the proximity and functionality level information, block 712. The method uses the optimum data rate and content **format** for communicating the content with the communication device and presenting the content at the communication device, block 714. As used herein, content may comprise a wide range including but not limited to graphic, video, audio, multi-media, text content or any combination thereof.

Detailed Description Text - DETX (32):

Referring to FIG. 8, a diagram of a data stream for a graphic content consisting of 5 individual graphic images is shown. As shown, each graphic image is represented by a image data packet 810 that together form the graphic content. The graphic content, which can, for example, correspond to a moving graphic advertisement, is communicated with appropriate control information 812 that indicate the content **format**. The content **format** defines how the individual image packets presented to the user. For example, the content **format** may define how the images are synchronized with each other to form a moving graphic image. Each image data packet 810 is suitably formatted with headers 814 and enders 816. The control information 812 defining the content **format** can include one or more of the number of graphic images, sized of each graphic image, graphic display speed, screen size **format** of each graphic image, and functionality level of the graphic content.

Detailed Description Text - DETX (33):

In those areas where the data rate is acceptable and the device functionality level is adequate, the content **format** provides for complete data stream containing the 5 individual image data packets 810 as well as the control information 812 is sent to the communication device for presenting the image content to the user. However, when a supported data rate is not adequate, for example, when the communication device is further from a BTS and the feasible data rate is lower, the number of communicated graphic packets is reduced. For example, only one image data packet 810 can be transmitted with appropriate control information 812 for the communication device to display the graphic content as a still image. In case the graphic content has a higher functionality level and the device has basic functionality level, for example, when the communication device can display still images only but can not accommodate moving images because of display or processing limitations, the number of communicated image packets is reduced to accommodate the device functionality.

Detailed Description Text - DETX (34):

From the foregoing description it would be appreciated that the present invention allows communication devices to receive content in some **format** regardless of functionality or proximity, providing optimum user experience regardless of device capability or position. The present invention also allows for maintaining air time capacity at an optimal level by increasing probability

of message reception without errors.

Claims Text - CLTX (1):

1. A communication system that provides content to communication devices over a wireless channel, comprising: a receiver that receives proximity information and display functionality level information associated with a communication device; a controller that, based on the proximity information, determines an optimum data rate and, based on the display functionality level information, determines an optimum content format for communicating the content over the wireless channel; and a transmitter that uses the optimum data rate and optimum content format for transmitting the content to the communication device over the wireless channel.

Claims Text - CLTX (4):

4. The communication system of claim 3, wherein the one or more data packets are communicated with control information that defines the optimum content format for presenting the content at the communication device.

Claims Text - CLTX (5):

5. The communication system of claim 4, wherein the one or more data packets that are transmitted in accordance with the optimum content format is adjusted based on at least the display functionality level information.

Claims Text - CLTX (8):

8. The communication system of claim 7, wherein the graphic content is transmitted with control information that includes at least one of: a number of graphic images, size of each graphic image, graphic display speed, screen size format of each graphic image, and functionality level of the graphic content.

Claims Text - CLTX (14):

14. The communication system of claim 13, wherein the control information which is received includes at least one of: number of graphic images, size of each graphic image, graphic display speed, screen size format of each graphic image, and functionality level of the graphic content.

Claims Text - CLTX (16):

16. A method of communicating content with a communication device over a wireless channel comprising the steps of: receiving proximity information and display functionality level information from the communication device; determining an optimum data rate based on the proximity information; determining a content format based on the display functionality level information; and communicating the content with the communication device using the optimum data rate and the content format.